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The impact of potassium-induced energy expenditure on glycaemic response with special reference to the glycaemic index

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The glycaemic index (GI) is a food-scoring index based on blood glucose response (GR). The conventional orthodoxy of GI evolves around the concept of blood glucose appearance rate and factors associated with it. However, blood glucose concentration is a function of both the rate of glucose appearance into the systemic circulation and the rate of glucose disappearance. Irrespective of the concept of GI, the availability of insulin and the rate of energy expenditure (EE) have been shown to influence blood glucose concentration. Potassium (K) is strongly implicated with insulin secretion in addition to stimulating EE[(2)]. The aim of this research was to investigate the impact of K-induced EE on GR.

The effect of high-K allbran breakfast cereal (AB) (1215.8 mg/serving) and low-K cornflakes (CF) (72.1 mg/serving), on EE and GR was investigated in a total of 12 subjects (7 males and 5 females) according to standard procedures[(1)]. Blood glucose was measured at 0, 15, 30, 45, 60, 90 and 120 min. Concomitantly, the Deltatrac metabolic monitor was used to measure the EE for the duration of 120 min, post absorptive stage. The intake of 50 g equivalent carbohydrates portion of AB resulted in a significant 42 % ($P = 0.048$), 55 % ($P = 0.003$), 74 % ($P = 0.0001$) and 58 % ($P = 0.010$) reduction in GR, at the 45th, 60th, 90th and 120th min, respectively, as compared to CF (Fig. 2).

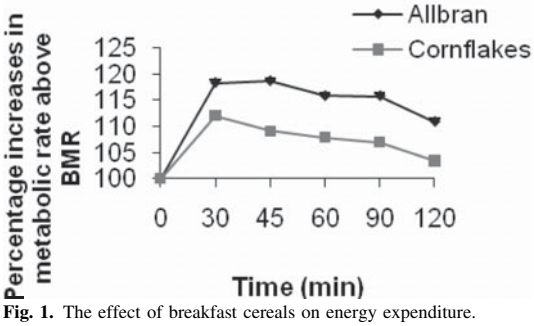

Fig. 1. The effect of breakfast cereals on energy expenditure.

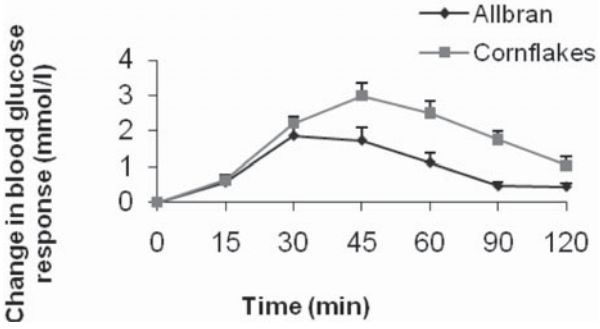

Fig. 2. The effect of breakfast cereals on glycaemic response.

The ingestion of 50 g equivalent carbohydrate portion of AB resulted in a significant 18 % ($P = 0.02$), 19 % ($P = 0.004$), 16 % ($P = 0.01$), 16 % ($P = 0.03$) and 11 % ($P = 0.03$) increase in the metabolic rate above the BMR at 30, 45, 60, 90 and 120 min, respectively (Fig. 1). The correlation test indicated that the increased EE in AB as compared to CF is in significant inverse correlation ($r = -0.8$, $P < 0.05$) with the decreased GR in AB as compared to CF. The research showed that dietary-induced EE had a significant effect on GR. This is the first study to yield new insights into a hitherto unexplored area. Further investigations are required to elucidate the underlying mechanism of K in energy and glucose metabolism vis-à-vis the K-sensitive and glucose demanding Na/K-ATPase pump, GR and GI.

1. FAO/WHO (1998) Carbohydrate in Human Nutrition. Rome: FAO.
2. Jaedig S, Lindgarde F & Arborelius M (1994) Increased postprandial energy-expenditure in obese women after peroral K-phosphate and Mg-phosphate. *Miner Electrol Metab* **20**, 147–152.